

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

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# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/EP2004/051699

International filing date (day/month/year)  
03.08.2004

Priority date (day/month/year)  
07.08.2003

International Patent Classification (IPC) or both national classification and IPC  
C07C49/84, C07C211/27, C07D265/30, C08F2/48

Applicant  
LAMBERTI SPA

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 56.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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IAP20 Rec'd PCT/EP 02 FEB 2006

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**International application No.  
PCT/EP2004/051699**Box No. I Basis of the opinion**

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:  
☐ a sequence listing  
☐ table(s) related to the sequence listing
  - b. format of material:  
☐ in written format  
☐ in computer readable form
  - c. time of filing/furnishing:  
☐ contained in the international application as filed.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-16
	No: Claims	
Inventive step (IS)	Yes: Claims	3,4,8,9,14,15
	No: Claims	1,2,5-7,10-13,16
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	

**2. Citations and explanations****see separate sheet**

IAP20 Rec'd PCT/PTO 02 FEB 2006

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING  
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/EP2004/051699**Re Item V****Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

- D1: EP-A-0 003 002 (CIBA-GEIGY AG) 11 July 1979 (1979-07-11)  
D2: US-B1-6 492 514 (MENEGUZZO ENZO ET AL) 10 December 2002 (2002-12-10)  
D3: EP-A-0 088 050 (CIBA-GEIGY AG) 7 September 1983 (1983-09-07)  
D4: EP-A-0 850 253 (LAMBERTI S.P.A) 1 July 1998 (1998-07-01)

**1. Novelty (Article 33(2) PCT):**

- 1.1 D1 discloses photoinitiators used in the photochemically initiated polymerization and to form crosslinks in polyolefins. D1 discloses biphenyl ethers (compounds 17, 21, 34) and biphenyl thio ethers (compounds 20, 23). Compounds 17 and 34 comprise one unsubstituted phenyl ring. Compounds 20 and 23 are thio ethers. The phenyl groups of compound 21 bear the same substituents.

The compounds of the present invention differ from the compounds of D1 in that

- a) they are biphenyl ethers
- b) they comprise two substituted phenyl groups
- c) the substituted phenyl groups comprise different substituents.

Present compound claims 1-5, as well as dependent compound claims 6-9 then can be considered novel over D1.

The procedure of claims 10-15 and the solid substrate of claim 16 comprise using a photoinitiator of present claims 1-5.

The subject-matter of claims 10-16 then can also be considered novel over D1.

- 1.2 D2 discloses photoinitiators used in the photochemically initiated polymerization. The compounds of the general formula (I) can be biphenyl ethers, however, all examples disclosed in D2 are biphenyl thioethers.

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The compounds of D2 then differ from the compounds of the present claims in that the two phenyl groups are linked by a thioether bond.

Present compound claims 1-5, as well as dependent compound claims 6-9 then can be considered novel over D2.

The procedure of claims 10-15 and the solid substrate of claim 16 comprise using a photoinitiator of present claims 1-5.

The subject-matter of claims 10-16 then can also be considered novel over D2.

- 1.3 D3 discloses photopolymerizable colored masses comprising a photoinitiator. All biphenyl ether compounds disclosed in D3 are biphenyl thioethers.

Present compound claims 1-5, as well as dependent compound claims 6-9 then can be considered novel over D3.

The procedure of claims 10-15 and the solid substrate of claim 16 comprise using a photoinitiator of present claims 1-5.

The subject-matter of claims 10-16 then can also be considered novel over D3.

- 1.4 D4 discloses polymerization photoinitiators comprising a biphenyl thioether group.

Present compound claims 1-5, as well as dependent compound claims 6-9 then can be considered novel over D4.

The procedure of claims 10-15 and the solid substrate of claim 16 comprise using a photoinitiator of present claims 1-5.

The subject-matter of claims 10-16 then can also be considered novel over D4.

**2. Inventive Step (Article 33(3) PCT):**

- 2.1 D1 can be considered the closest prior art since it discloses structurally very close compounds which are also used to photopolymerize unsaturated compounds. The compounds of D1 also can be used in crosslinking polyolefins and exhibit good

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solubility in the substrate, all of which are properties the present compounds are also claimed to have.

- 2.2 Compounds 20 and 23 both are structurally close to the compounds of the present invention, but mainly differ therefrom by a thioether linkage between the two phenyl moieties. Comparative examples in the present description show that compounds which comprise a biphenyl thio ether group exhibit inferior properties such as reactivity, through-cure and white and yellow indices.

It can therefore be assumed that the presence of an ether instead of a thioether bond has a technical effect, e.g. better reactivity, through-cure and white and yellow indices.

- 2.3 Compound 21 is structurally very close to the compounds of the present invention and differs from the compounds of the present invention only in that both phenyl rings are substituted with the same substituents.

The difference between the compounds of claim 5 and compound 21 may for example be the presence of one ethyl group instead of a methyl group ( $R1=CH3$  and  $R2=C2H5$ ). The difference between compound 1a and compound 21 of D1 is that for one substituted phenyl moiety the substituents adjacent to the hydroxy group are two ethyl instead of two methyl groups. It is not apparent from the present application that this difference has a technical effect.

The technical problem then could be seen in providing alternative photoinitiators with good reactivity, through-cure and white and yellow indices.

The solution suggested, in the absence of any other technical effect linked to the difference between the compounds of the invention and compound 21, seems obvious in light of D1 since in claim 1 of D1 substituents R1 and R2 of compound I can be C1-C8 alkyl. The person skilled in the art would only have to chose from a predefined selection of substituents to find alternative compounds.

The subject-matter of claims 1, 5 and 6 then cannot be considered <sup>inventive</sup> in view of D1.



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- 2.4 The same objection is also raised against the subject-matter of claims 2 and 7 since in claim 1 of D1 R1 and R2 can also form a cycle.
- 2.5 It is at present not clear which technical features claimed in present claims 10-13 and 16 could justify an inventive activity.

The subject-matter of claims 10-13 and 16 then are also not considered inventive over D1.

- 2.6 Test disclosed in the present description show that compounds of formulae Ic and Id exhibit the desired properties. D2 discloses a photoinitiator which corresponds to comparative example II of the present application. Tests made with the comparative compound show the superior properties of the compound of the invention having a ether instead of a thioether bond linking the two phenyl moieties. D1 does not suggest compounds of formulae Ic and Id.

Present claims 3, 4, 8, 9, 14 and 15 then can be considered inventive.

**3. Industrial Applicability (Article 33(4) PCT):**

The subject-matter of claims 1-16 is industrially applicable.